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Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BET 03L0143	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FR2003/002894	International filing date (day/month/year) 02 octobre 2003 (02.10.2003)	Priority date (day/month/year) 02 octobre 2002 (02.10.2002)
International Patent Classification (IPC) or national classification and IPC F03B 3/12		
Applicant ALSTOM TECHNOLOGY LTD		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 10 avril 2004 (10.04.2004)	Date of completion of this report 14 October 2004 (14.10.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FR2003/002894

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
 pages 1,3,4,6, as originally filed
 pages _____, filed with the demand
 pages 2,2a,5, filed with the letter of 04 October 2004 (04.10.2004)
- ☒ the claims:
 pages 7-9, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages 1-6, filed with the letter of 04 October 2004 (04.10.2004)
- ☒ the drawings:
 pages 1/4-4/4, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/FR 03/02894

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-9	YES
	Claims		NO
Inventive step (IS)	Claims	1-9	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-9	YES
	Claims		NO

2. Citations and explanations

1. The subject matter of independent claim 1 appears to comply with the requirements of novelty and inventive step of the PCT.

Document **US 4 479 757** describes:

(a) a Francis-type turbine having all of the technical features defined in the preamble of claim 1 (cf. figures 1, 2);

(b) the neutral axis of a blade at the leading edge thereof (through the centre of the blade body) extends over the entire height of said leading edge ("from said band toward said crown", claim 1) in a straight line (continuation of the neutral axis) at an angle of more than 90° to the direction of the vector of the linear forward velocity of said leading edge ("sloped rearwardly in the direction of rotation", claim 1) (cf. figures 3 and 4).

It should be noted that documents **Brekke, H.:** "Why not make the turbines cavitation free?" and **GB 237 963** disclose Francis-type turbines in which the neutral axes of the blades at the leading edge are

also at an angle of more than 90° to the direction of linear velocity.

The subject matter of independent claim 1 differs from the Francis-type turbine described in document **US 4 479 757** in that:

(c) the ratio of the maximum thickness of each blade to the mean bend allowance of the neutral axis thereof is between 0.1 and 0.2.

The technical problem that this difference is intended to solve in the light of the technical features is that of providing a Francis-type turbine that can operate in such a way that vortices and cavitation are averted even when the turbine is exposed to variable use conditions.

The subject matter of claim 1 as defined by the combination of technical features (a), (b) and (c) is not found in and does not appear to be obvious from the prior art.

It follows that the subject matter of independent claim 1 complies with the requirements of novelty and inventive step of the PCT.

2. Dependent claims 2 to 8 as well as independent claim 9 refer to claim 1. Therefore, these claims also comply with the requirements of novelty and inventive step of the PCT.